

ERRATA.

Annual Report, Agricultural Department, 1917.

- Page 2. Line 5—for “A. E. G. Borlie” read “A. E. Gborlie.”
- Page 5. Paragraph 21 line 7—for “under-formented” read “under-fermented.”
- Page 6. Paragraph 22 line 6—for “30 per cent.” read “80 per cent.”
- Page 9. Paragraph 50 in “Maize ; wet season trials” table under the head “Period of growth (days)” —for the figures “312” and “156” read “112” and “136” respectively.
- Page 10. Paragraph 50 in table for “Percentage of grain to cob in above maize trials” and under column “Rain,” —for “81·39” read “21·39.”
- Page 11. Paragraph 51 in column “Period of growth” —for “163” read “160.”
- Page 12. Table A line 4 in column “Method of planting” —for “type” read “tips.”
- Page 13. Table B opposite “Plot treatment” —in column “Lot A” read “Manured with well rotted organic matter” and in “Lot B” read “No manure ; surface soil hilled” for “Well manured ; surface soil hilled.”
- Page 13. Table B under column “Lot A” —in line 14 for “483” read “453” and in line 16 for “1,793” read “1,739” and under column “Lot C” for the last figure £3 18s. 8d. read “£8 18s. 8d.”
- Page 15. Paragraph 62—the head of last column should read “Percentage of prepared Coffee to Berries.”
- Page 16. In Table of “Coffee fermentation trials” —in the second column for “185 lb.” read “184 lb.” and in column 4 of the same table for “36·97” read “26·97.”
- Page 18. In Table first column, “Name,” —for “Artocarpus, various” read “Artocarpus, var.”
- Page 19. Paragraph 76 line 5—for “succomb” read “succumb.”
- Page 20. Paragraph 82 line 1—for “Imperate” read “Imperata.”
- Page 21. Line 7—for “Nawai” read “Hawaii” and in paragraph 84 line 1 for “Mr. W. Waterland” read “Mr. H. Waterland.”
- Page 25. In Table “Reference to Diagram 1” under column “1913” —for “30·4” read “50·4.”
- Page 26. Line 15 for “fall” read “fell.”
- Page 27. In Table Average yearly yields of “Jobboi” rices—for the heads of columns “History of Plot” read “History of Plots.”



COLONY OF SIERRA LEONE.

ANNUAL REPORT
ON THE
AGRICULTURAL DEPARTMENT
FOR THE YEAR
1917.

THE AGRICULTURAL DEPARTMENT,
NJALA,

1st April, 1918.

SIR,

I have the honour to submit the Annual Report on the Agricultural Department for the year 1917.

I. Staff.

2. During the year under review the staff comprised the following officers:—

The Director of Agriculture. Mr. D. W. Scotland returned from leave on 21st March and was in the Colony till the end of the year.

Assistant in the Agricultural Department. Mr. H. Waterland was Acting Director of Agriculture from 1st January to 21st March. Mr. Waterland had no leave during the year.

Superintendent of the Experimental Farm. Mr. S. L. Moseley was granted ten days local leave from 8th to 18th June. He was on duty for the remaining part of the year.

Mr. S. L. Moseley completed his three years' engagement on 29th April and was re-engaged on the permanent staff.

Overseer in charge of Nurseries. Mr. S. Thomas had no leave during the year.

Overseer, Cocoa Station, Bumpe. Scholar C. Borbor Sandy was put in charge of this station at the beginning of the year.

3. Mr. J. M. Watt, the Second Assistant in the Agricultural Department, has been attached to the Censor's Office during the whole of the period.

4. *Clerical Assistant.* Gaigba Meama, late Agricultural scholar in this department, has been the Clerical Assistant.

5. I wish to place on record my appreciation and thanks to the senior officials of my staff for their interest and help in the welfare of the department. Although being short of staff and having to put up with the trials and disappointments of ignorant and unskilled labour, the interest and energy of these officers were in no way abated at a time when all have to make sacrifices.

II. Agricultural Scholars and Apprentices.

6. The three scholarships, tenable for three years and granted to Bo school boys, have been held by :—

Santigge F. Kebia	Selected May, 1916
Wusu D. Sanue	„ June, 1916
A. E. G. Borlie	„ January, 1917.

7. There were five apprentices attached to the department :—

E. Smith	Appointed 1st February, 1917
E. Pratt	„ 20th March, 1917
Ansumana Camara	„ 23rd March, 1917
Momodu Falla	„ 5th April, 1917
Ibrahim Sawannah	„ November, 1918.

Momodu Falla was dismissed after the examination at the end of the year, as he showed no progress in his work.

Ibrahim Sawannah's apprenticeship was cancelled on 15th November.

8. The scholars and apprentices are given an allowance of £18 per annum for a period of three years. Only ex-Bo school boys are eligible for scholarships, whereas apprenticeships are open to youths of the Colony or Protectorate. One of the objects of this scheme is to produce trained men suitable to hold appointments in the department as overseers, instructors, inspectors, etc.

9. Mr. Waterland, in his report on the training of these pupils, reported as follows :—

“The teaching was necessarily of a very elementary character and mainly dealt with simple scientific explanations of experiments carried out on the land.

The aim of the teaching, so far as possible, was to cultivate the power of observation by actual detection of properties and characters and by reasoning based on personal observation. The experiments performed were of such a nature as to render clear the salient points dealt with in class, and were so arranged as to exercise the faculties of the mind as well as to promote manual skill. The object of each experiment was fully explained before hand and no boy was permitted to commence work until he thoroughly understood what he meant to do and how he meant to do it.

The chief difficulty in respect of the pupils lay in their lack of knowledge of the English language, which was so pronounced as to render them almost incapable of giving expression to their thoughts, and which made progress very slow. This fact, coupled with a low average standard of intelligence, is of importance in that it limits the extent to which the boys will repay training in agriculture.”

10. There is no doubt that the department has been unfortunate in the type of youths that have entered as scholars and apprentices. The better class boys prefer to enter the Government clerical service and the mercantile houses where the emoluments are attractive. In the near future the agriculture service for native officials will be defined and attractive salaries will be offered to draw the desirable class of young men for a profession in which intelligence, powers of observation and ability to control labour are essential factors to attain success. The lack of intelligence in the present class of boys retards rapid progress in a young department and it is doubtful whether any of these youths would be fit persons to put in charge of substations as overseers.

III. Revenue and Expenditure.

11. REVENUE. The total receipts amounted to £64 16s. 5d. This was realized from sales of produce, seeds and stock plants. There was a large free distribution of seeds and plants.

12. The Vote of expenditure for 1917 was as follows :—

	£
(a) Personal Emoluments	1,500
(b) Other Charges :	
Contingencies	100
Agricultural development	225
Hammock allowances	100
Labour and Native Assistants	800
Transport, travelling allowances, etc.	650
Library	15
Laboratory appliances	10
Rent of experimental farm	8
Agricultural shows	50
Apprentices	100
	<u>£3,558</u>

<i>Expenditure.</i>	£	s.	d.
(a) Personal Emoluments	1,551	8	7
(b) Other Charges :—			
Contingencies	39	13	9
Agricultural development	154	11	8
Hammock allowances	81	2	6
Labour and Native Assistants	803	7	7
Transport, travelling allowances, etc.	486	16	6
Library	2	18	7
Laboratory appliances	4	7	6
Rent of Experimental Farm	8	0	0
Agricultural Shows	49	0	6
Apprentices	73	11	7
	<u>£3,254</u>	<u>18</u>	<u>9</u>

IV. Plant and Seed Distribution.

13. The cultivation of plants for distribution was carried out. The demand for plants and seeds exceeded the supply.

14. The following plants and seeds were distributed—Stock for Government plantations and substations are not given in these figures.

Plants.

Banana suckers	135
Plantain suckers	75
Sour sop	20
Sweet sop	15
Avocado pears	15
Oranges	145
Breadnut	65
Melia	130
Lime	5,064
Loquat	22
Kola	380
Shaddock	19
Guava	25
Pineapple	30
Lemon	70
Mango	70
Coffee—Stenophylla	100
Various	73
Total	<u>6,393</u>

Seeds.

Groundnuts	...	...	...	185 lb.
Rice	...	...	...	893 "
Bengal beans	...	...	...	84 "
Yams	...	...	...	100 "
Maize	...	...	...	1,669 "
Cow pea	...	...	...	2 "
Cocoa	...	...	...	122 pods
Para rubber	...	...	...	2,000 seeds
Vegetables	...	...	...	15 packets

V. Stock in Nurseries at Experimental Farm, Njala, December, 1917.

15. Limes—bedded out	3,000	Cocoa, selected	...	121
Limes	3 beds	Cocoa—local	...	424
Para rubber	2,400	Cocoa—Gold Coast	...	1,150
Rough lemon	409	Mango	...	1,072
Saman	838	Coffee—various	...	507
Oranges	2,616	Coffee—stenophylla	...	400
Sweet sop	408	Coffee—stenophylla	...	22 beds
Sour sop	120	Kola	...	1,276
Breadnut	132	Avocado pears	...	20
Guava	220	Various	...	1,574
Sugar apple	348			

VI. Plants and Seeds Received.

16. The following have kindly forwarded stock to this department :—

PLANT BREEDING STATION, BUITENZORG, JAVA. Seeds of Coffee *Excelsa* No. 121 -o, 4 and Coffee *Ugandae hybrid* No. 2 T 142 and No. 3 T 142.

REASONER BROTHERS, ONECO, FLORIDA. Seed of Rough Lemon.

BOTANIC GARDENS, SAHARANPUR, U. P., INDIA. Seed of *Codonaea Viscosa*, *Poinciana pulcherrima*, *Canna Indica* mixed, *Averrhoa Carambola*, *Carissa Carandas*, and *Tabernaemontana Waillichi*.

MRS. E. V. PAROI I, MOYAMBA, RONIETTA DISTRICT. Four plants of Date Palm.

AGRICULTURAL DEPARTMENT, GOLD COAST. 100 pods *Cocoa*, var. *Foretero*.

AGRICULTURAL DEPARTMENT, NORTHERN PROVINCES, NIGERIA. *Onion Seed*.

VII. Agriuctlural Shows.

17. In the past a large amount of rubbish and poor quality produce were entered by exhibitors for competition ; to put a stop to this and to raise the standard of exhibits the department drew up a schedule of classes and sections with particulars in which were defined what constitutes a proper exhibit under each section. A large number of exhibits had to be rejected at the Show, as the exhibitors did not conform to the schedule. Considering 1917 was the first year this trial was made, quite a large number of exhibits were admitted and, as a result of this "weeding out," there was a marked improvement in the standard and quality of produce.

18. **BONTHE AGRICULTURAL SHOW.** I wish to express my thanks to the gentlemen and mercantile firms for their subscriptions towards prizes. The total amount subscribed was £16 13s. 6d. The Government vote was £25. The Show was held at Bonthe on 6th December. The total number of exhibits amounted to 602, which formed about twelve classes and were further subdivided into eighty-five sections.

19. The following extract on some of the important exhibits is taken from the report of the Bonthe Agricultural Show :—

Palm Oil. Thirty-eight exhibits. Some of the oils were of excellent quality. Traders remarked that they wished they could procure such refined oil.

Palm Kernel Oil. Twelve exhibits. Most of these oils had a burnt smell and flavour due to the crude method of extraction.

Coconut Oil. Ten exhibits. The first prize oil was clear and white with a good taste and odour. The other samples were fairly free of sediment, but colour and smell were poor.

Groundnut Oil. Six samples. These were of fair quality.

Yams. Twelve exhibits. Enormous specimens were shown, the largest one weighed 1 cwt. 2 qrs. 13 lb.

Beans. There was a large assortment of some bright bold beans.

Coffee. Thirteen exhibits. These were chiefly of the Liberian type.

Kola. Exhibits were poor.

Fruits. The citrus fruits were good. There were some fine samples of limes. Eight kinds of fruit were shown.

Piassava. This class was most disappointing. There were only two exhibits.

Coconuts. Consisted of some fine large nuts.

20. **WATERLOO AGRICULTURAL SHOW.** This Show was held on 14th December. His Excellency kindly opened the Show and gave the people of Waterloo a short address. There was a marked improvement in the quality of exhibits, which totalled 570. Mr. T. Wilberforce helped the officers of this department in judging. Mr. R. S. Greaves was untiring in his help in receiving and arranging exhibits and in the decorating of the hall for the Show.

21. Extract from the report on the Show :—

There were no specimens of very special merit.

Cocoa. The samples of beans were clean and bold, evidently specially washed for the occasion. The fermentation of these beans was not carried out long enough.

Coffee. The class of Sierra Leone Coffee (*C. stenophylla*) was well represented. The specimens were clean, but under-fermented and evidently washed.

Fruit. The native oranges were good and some of the limes were of excellent quality.

Coconuts. A few large round nuts were exhibited.

Vegetable Oils. The class was poor.

Ginger and Arrowroot. There were some excellent fresh green specimens, but no prepared lots.

Chocolate. A few interesting specimens of native manufacture were entered in the Show.

VIII. Scheme for the Encouragement of Coconut planting.

22. The 1,000 seed coconuts requisitioned from Ceylon arrived in the Colony in early January. The nuts failed to germinate. The coconuts were about three months in transit from Ceylon. The failure of the nuts to germinate cannot be accounted for; it could not be due to too long a period in transit, because this department in 1913 receives a consignment of seed coconuts from Ceylon; these took over three months in transit and gave a germination of over 30 per cent.

23. Seed nuts were purchased locally to start nurseries at Bonthe and on the Bullom Shore. A number of nuts have already been planted at Yongro. Owing to the local demand for the few coconuts obtainable in the Colony, the department has had considerable difficulty in procuring desirable types of seed.

24. A few chiefs made applications for coconuts.

IX. Cocoa Cultivation in Northern Sherbro.

25. I am glad to report that the cultivation of Cocoa has increased. The area now is extending northwards from the east portion of the Northern Sherbro District into the south of the Railway District, where the majority of the villages have either kola seedlings planted around the collection of huts or beds of cocoa seedlings growing in the gardens. Cocoa cultivation is entirely in the hands of natives, who plant small areas around their towns and villages. The area suited to cocoa is limited in Sierra Leone, as far as one can judge so far, to the south and south-eastern parts of the Protectorate, where a most promising industry is being built up.

26. Practically all the cocoa is sold to the traders in an unfermented state. The energies of the department have been directed along lines to induce the native planters to ferment their beans and I am glad to report that several of the people have started to ferment their beans, although at present the fermentation process is not allowed to extend over a long enough period; this can be rectified in time, but it is encouraging to note that several of the older planters, whose confidence has been gained by the department, have started to prepare the beans along the right lines.

27. A bag of native prepared cocoa was forwarded by this department to the Imperial Institute, London, for valuation. The Director of the Imperial Institute reported as follows:—

“Commercial Valuation.”

The cocoa was submitted to brokers in London and Liverpool, who reported on it as follows:—

- (i) A London firm stated that the sample represented good cocoa of the Lagos type and described it as clean and bright, but having a rather slatey break. They valued it at about 61s. per cwt. in bond (June 21st, 1916.)
- (ii) A Liverpool firm regarded the sample as of good appearance, but not fully fermented and valued it at 67s. per cwt. (June 1st, 1916). Adding that if the whole of the cocoa had been well fermented it would have been worth 69s. to 70s. per cwt. on the same date F. A. Q. Accra cocoa was quoted at 66s. to 70s. per cwt.
- (iii) A second Liverpool firm stated that the cocoa was only partly fermented and was about equal in quality to F. A. Q. Accra cocoa, which on the same date was worth 59s. per cwt. (June 21st, 1916).

Remarks.—The result of the chemical analyses shows that the cocoa is of normal composition. The beans were clean, but they varied a good deal in size and were incompletely fermented.”

28. The Agent, Compagnie Francaise de l'Afrique Occidentale, at Bonthe, Sherbro, kindly furnished me with the following report on a shipment of cocoa in December, 1917:—

“This particular lot has evidently had an extra washing to improve its appearance. However, the appearance of cocoa actually counts for very little

and what buyers really pay a premium for is cocoa, the quality of which is well fermented. In any case cocoa which is unduly washed loses part of its virtue."

The Agent stated that a deduction of 8 per cent. was made for defective beans.

29. The purchase of cocoa in the past appears to have been entirely in the hands of one firm, Compagnie Francaise de l'Afrique Occidentale. The average price paid to the native was 4*d.* per lb. The practical support by this company has aided considerably in fostering a young industry.

30. The Agent of the above company at Bonthe kindly provided me with the following purchases of cocoa at his Sherbro factories during the past years :—

1913	637 lb.
May, 1914 to April, 1916	3,772 lb.
May, 1915 to April, 1916	14,048 lb.
May, 1916 to April, 1917	22,737 lb.
May, 1917 to April, 1918	36,930 lb.

The above figures are interesting. Within five years the 'cocoa purchases have increased sixty fold.

31. The report and value of cocoa from The Port of Sherbro has been as follows :—

Year.	Weight in lb.	Value.
		£
1914	2,128	45
1915	4,480	79
1916	10,976	237
1917	31,808	684

32. At the close of the year Compagnie Francaise de l'Afrique Occidentale had on hand approximately 6 tons of cocoa valued at about £856. If all the cocoa had been exported in 1917 it would have been totalled about 44,800 lb. with a value of about £900.

33. A Cocoa Station has been started at a town called Bumpé. Overseer C. Borbor Sandy has been put in charge. The Overseer's duty, beyond being in charge of the newly established cocoa plantation, is to help and advise the native planters. Four visits were made by officers of this department to the cocoa districts.

34. The cocoa plantations are by no means free from pests. Attacks have been noticed of :—Cocoa Bark Sapper (Sankonuahe or Akate—Gold Coast names) *Sahlbergella* spp. and "Cocoa Mosquito" *Helopeltis* sp. Monkeys are exceedingly destructive to the ripening pods and many complaints have been made against this pest.

X. Patrols by Officers of the Department.

35. Owing to the shortage of staff, officers could not be spared for touring through the country as in past years. For three months in the year there was only one European officer attached to the department. A number of patrols were, however, made and reports were submitted. During these tours advice was given to planters and farmers, also the work and objects of this department generally advertised in order to get into closer touch with the actual farming community.

XI. Visits of Chiefs to the Experimental Farm, Njala.

36. During 1917 the Experimental Farm was visited by parties of chiefs and their retainers from the Karene District and sub-districts of Port Lokko and Bombali. The District Commissioners of the districts accompanied the parties. The work at Njala

was carefully explained to the visitors. All the chiefs carried away with them plants and seeds to grow in their chiefdoms and many of them expressed the wish that the department would help them to make plantations of various economic plants suited to their locality. I was informed by Colonel H. G. Warren, District Commissioner of Karene, that Alimami Samba, one of his important and influential chiefs, toured his country for purpose of telling his people what he saw at Njala and explaining to them the work that is being carried out by this department.

XII. Substations.

37. **BUMPE COCOA STATION.** At the beginning of the year a nursery for cocoa was made and 1,800 cocoa seedlings were raised in basket pots. Four plots of land were cleared with a total area of 6 acres. Fringing bush was left around each plot to form a wind break. The seedlings were planted out in July. The young plants are doing very well. Mud huts were built by the Paramount Chief for the Overseer and Watchman. Overseer C. Borbor Sandy was in charge of the station during the year and carried out his work with credit, considering very little assistance was given this department.

38. **BATKANU.** Ten acres of land were cleared in a grass area near Batkanu and planted up with rubber stumps as an experiment. The greater number of these stumps were young, consequently they did not stand the long journey to Batkanu; unfortunately most of the stumps did not thrive. During the rains a good site was selected for nurseries in which a large quantity of rubber and kola seeds were sown. These nurseries will, in the future, be a centre for distribution of stock in this northern district. I wish to place on record my thanks and appreciation to Colonel H. G. Warren, the District Commissioner, for his invaluable help and the great interest he has taken in the starting of this substation.

39. **YONGRO, BULLOM.** A site was selected at Yongro, on the Bullom Shore, opposite Freetown, for a nursery for coconuts, where a number of nuts, purchased locally, have been put out for germination to start a Coconut Model Farm. Beyond this the station will be used to demonstrate to the people proper methods of tillage and cultivation. The people of Bullom supply the Freetown market with provisions, vegetables and fruit. Owing to the crude method of farming practised by the people the soil is worked out and starved. The importance of manuring must be forcibly demonstrated to them.

40. **WATERLOO.** A site was selected for a model farm, but the final settlement of taking over the land by this department had not taken place at the close of the year. A Waterloo boy was selected as an apprentice.

41. **GLOUCESTER.** A site was selected and reported on near the village of Gloucester. One of the boys from the village was apprenticed to this department.

XIII. General Report on Agriculture.

42. During 1917, the natives were particularly active in the planting of rice in the Karene and Koinadugu Districts, where the question of food for the coming hungry season appears to be more favourable than the past few years. Whereas the rice crops for 1917 in the other districts were about normal. There should be no scarcity of rice, owing to the increased cultivation in the northern parts where in the past, during the rains, large quantities of rice from Mendi country have been taken to replenish supplies of thickly populated centres. There should not be this drain on the stocks of rice in Mendi country during 1918 and, consequently, the prospects for the 1918 hungry season, I consider, are good.

43. A noticeable feature about the rice farms in the Railway District was that an appreciable quantity of unharvested rice was left on the farms. It appears that the farmers were not able to keep in check the weeds, so they abandoned a part of their farms. That is, the farmers had cut down a far greater area of bush for their rice than they could cope with and, literally, bush land had been wasted.

44. The gambling in stocks of rice was put a stop to in 1917 by Government controlling the price and prohibiting the export except on licence. The highest price for rice was 15s. per bushel (84 lb.).

45. Kola reached the record price of about £32 per measure of 176 lb. during the close of the rains. This was due to the failure of the early crop caused by the unusually severe tornados damaging the flowers. At the end of the year the price fluctuated to about £9 per measure.

46. The groundnut crops in the north suffered severely by the heavy and prolonged rains. Disease was common. Experiments are being carried out to overcome this.

47. The price paid to farmers for ginger varied from 1½d. to 2d. per lb. Owing to this increased price large quantities were sold. The 1917 exports show an increase of 166 tons on 1916 and it doubles the 1915 export of ginger.

Dry peppers (chillis) realized 9s. to 13s. per bushel of 28 lb.

48. The prices of palm oil and palm kernel were controlled by the Government in England. The prices up country varied as follows :—

Palm oil	per can of 4 gallons	5s. 6d. to 10s.
Palm kernels	per bushel of 63 lb.	4s. 9d. to 8s. 6d.

XIV. The Experimental Farm, Njala.

49. The experimental work at the headquarters station was carried out by Mr. S. L. Moseley, Superintendent of the Experimental Farm. He has compiled a large amount of exceedingly useful data from the experiments that were carried out during 1917.

50. *Maize.* Trials were made during the wet and dry seasons.

MAIZE. WET SEASON TRIALS.

Variety.	Yield per acre. (lb.)	Period of growth (Days).	Amount of rain on crop (Inches).	No. of Days Rain fell.	REMARKS.
Maize, local	186.62	110	61.37	94	Previous crop, maize. Plot mulched with green manure shortly before sowing. Sown on banks.
Maize, local	292.50	312	62.04	97	As plot above, except that mulch consisted partly of decomposed organic matter.
Maize, Lagos, white	831.69	156	57.81	101	Previous crop, maize. Plot mulched with partly decomposed organic matter. Sown on flat 4ft. x 1ft.
Maize, Lagos, white	1,208.87	146	69.96	116	Previous crop, ground-nuts. Plot mulched with ground-nut haulms and brushings of legumes. Sown on flat 4ft. x 1ft.

The above experiments were carried out on 1 acre plots.

White Lagos maize gave the heaviest yields. The cobs were large and well filled up.

The local maize experiments proved that decomposed mulches should be applied to the land to give immediate returns. The local variety is an early maturing type of maize as compared with the White Lagos. The yield of 1,209 lb. (about 20 bushels) per acre of White Lagos maize is fair for Sierra Leone. This yield was got by rotating the maize crop after a leguminous crop (ground-nuts) and the land being mulched with the ground-nut haulm (dried leaves and stems) and brushings from legumes.

MAIZE. DRY SEASON TRIALS.

Variety.	Yield per acre. lb.	Period of growth, days.	Amount of rain on crop, inches.	No. of days rain fell.	REMARKS.
Maize, Lagos, white	814.4	122	19.51	30	Previous crop, maize. Plot mulched with decomposed organic matter. Sown on flat 4ft. x 1ft.
Maize, Lagos, white	936.5	116	21.39	31	do.

The above experiments were carried out on one acre plots. The plots were badly damaged by a tornado. The plants that were "laid" were earthed up again, but a great number of plants were broken. Considering the damage done the yield was good.

Percentage of grain to cob in above maize trials :—

Variety.	Area.	Distance sown.	No. of cobs per acre	Weight of cobs per acre.	Weight of grain per acre.	Percentage of grain to cob and grain.	Rain.
Lagos, white ...	1	4 ft. x 1 ft.	5,218	1,021.85	851.59	81.39	57.81
Lagos, white ...	1	4 ft. x 1 ft.	6,759	1,495.42	1,208.87	80.83	69.96
Lagos, white ...	1	4 ft. x 1 ft.	6,964	1,114.24	814.40	73.00	19.51
Lagos, white ...	1	4 ft. x 1 ft.	7,045	1,121.91	936.53	83.40	81.39

Further trials must be made before any definite conclusions can be drawn as to the effect of rain on the percentage of grain to cob in the maize crop.

51. *Rice.* A number of varieties of rices have undergone trials at the Experimental Farm in the past. By selection and elimination of the varieties, the department has now a few good types, mostly varieties from British Guiana. Of these, Demerara Creole appears to give the best results.

The rices were planted under upland conditions, the total rainfall on the growing crop was 83·17 inches, which fell for 123 days out of 161 days of the plant's life.

The object of the rice plots was to maintain a supply of seed of the selected varieties.

A trial was made of dressings of sulphate of ammonia which was applied to the land as a top dressing on the crop. The results were interesting, and the trials showed beyond doubt that nitrogen is the principal ingredient required in the soil. This nitrogen can be added to the soils of Sierra Leone in the form of well rotted mulches.

The following table gives the results of the rice plots :—

Variety.	Dressing of sulphate of ammonia.	Yield per acre, bushels.	Weight of husk rice, per bushel.	Period of growth.	Amount of rain on crop.	No. of days rain fell.	REMARKS.
British Guiana O. 75	Nil	10·7	43·5	158	83·17	124	
British Guiana O. 75	1 cwt	11·9	42·0	158	83·17	124	Applied in one dressing.
British Guiana 75 v. 7	Nil	6·8	42·0	163	83·17	124	
British Guiana 75. v. 7	1 cwt	9·3	42·5	160	83·17	124	Applied in one dressing.
B. G. Demerara Creole	Nil	11·3	40·0	161	83·15	123	
B. G. Demerara Creole	2 cwt	15·1	41·5	161	83·15	123	Applied in two dressings.
British Guiana var.	Nil	7·6	40·0	161	83·15	123	
British Guiana var.	2 cwt	14·5	41·5	161	83·15	123	Applied in two dressings.

The size of the plots were $\frac{1}{3}$ acre each. The plots were not mulched.

52. *Ground-nuts.* The crop stood the early rains well and there was promise of a good crop, but at the end of the rains the plants were badly diseased.

53. *Ground Provisions.* During the year, an important position was given to under ground crops. Experiments were carried out in methods of planting, etc., in order to obtain further data. It is important that the natives should pay greater attention to these crops, especially at a time when there is a scarcity of food as these plants readily respond to cultivation and manuring and give good yields with reasonable care.

TABLE A.

GROUND PROVISION TRIALS.

C R O P.	Yield per acre.			Growth Period, Months.	Method of Planting.
	Tons.	Cwt.	Lb.		
Tannias or coco. or coco yam	3	7	56	9	Division of "heads" planted on small conical hills 3ft. apart.
Sweet potato ...	2	0	57	4	"Cuttings" <i>i. e.</i> portion of vines (principally the type) 1ft. long planted on small conical hills 3ft., apart.
Ditto ...	2	11	63	4	"Cuttings" as above planted on long banks 3ft. apart. Cuttings planted 1ft. apart along the top of the banks.
Chinese yam, or Hausa potato	3	0	81	9	Soil mulched. Whole tubers (small) or pieces 2 inches to 3 inches long of large tubers, planted on long banks 3ft. apart and 1ft. apart on top of the bank.
Yams ...	5	0	93	9	Division of "heads" or "crowns" ($\frac{1}{2}$ lb. in weight) planted on small cones of soil 3ft. apart.
Yams ...	3	3	39	9	Divisions of body of yam-not "heads" about $\frac{1}{2}$ lb in weight. Each "set" plant on small conical hills 3ft. apart.
Yams ...	12	15	68	9	The land cross banked with well rotted organic matter. Division of "heads" or "crowns" planted in centre of squares between the banks.

Chinese yam or Hausa potato is a small variety of yam of excellent cooking qualities. Most of the yams are not much bigger than a large potato.

The yam "heads" planted on land cross banked with organic matter yielded heavily. The crop is a record for this station.

TABLE B.

DETAILS OF YAM TRIALS.

	Particulars.	Lot A.	Lot B.	Lot C.
1.	Area	294 sq. yards	264 sq. yards. No manure	88 sq. yards
2.	Plot treatment	Manured with rotted organic matter.	Well manured ; surface soil hilled	No manure. As B.
3.	Planting method	Cross banked 3ft. apart. Plants in squares.	Small conical hills 3ft. apart	Conical hills as B.
4.	Time planted	Early May	Middle and late May	Early June
5.	Weight planted	124 lb.	130 lb.	50 lb.
6.	Portion of yam used	"Head" or "Crown"	As A.	"Sets"
7.	*Failures	42 holes	16 holes	23 holes
8.	Date harvested	7th February	13th February	13th February
9.	Number of yams reaped ...	483	145	95
10.	Average weight per yam...	3.8 lb.	4.2 lb.	1.3 lb.
11.	Plot yield	1,793 lb.	616 lb.	129 lb.
12.	Plot yield per acre	Tons cwt. lb. 12 15 68	Tons cwt. lb. 5 0 93	Tons cwt. lb. 3 3 39
13.	Average yield per living plant	6.9 lb	2.48 lb.	1.9 lb.
14.	Yield per acre if all plants living	Tons cwt. lb. 14 18 20	Tons cwt. lb. 5 7 19	Tons cwt. lb. 4 2 12
15.	Cost to produce plot	£2 5s. 7d.	£0 9s. 0d.	£0 3s. 3d.
16.	Estimated cost of produc- tion per acre	£38 4s. 1d.	£8 5s. 0d.	£3 18s. 8d.

Failures were due to the attacks by beetles, termites and rodents.

The heavy expenditure for the production of lot A was due to the material for the mulch having to be gathered some distance from the plot. This expenditure can easily be considerably reduced by preparing the mulch adjoining the land to

carry the crop. Even with the heavy expenditure for production, lot A gave a better profit than either lots B or C as the following table shows :—

TABLE C.

COST OF PRODUCTION AND PROFIT PER ACRE OF
YAM CROPS IN ABOVE TRIALS.

Lot.	Actual Value of Crop per Acre. @ 1 <i>d.</i> per lb.			Cost of producing 1 Acre.			Profit.			REMARKS.
	£	s.	d.	£	s.	d.	£	s.	d.	
A.	119	5	8	38	4	1	81	1	7	If there had not been 672 failures (15 per cent.) to an acre, the profit would have been increased by £19 17 <i>s.</i> 4 <i>d.</i>
B.	47	1	0	8	5	0	38	16	0	If there had not been 330 failures (7 per cent.) to an acre, the profit would have been increased by £2 19 <i>s.</i> 2 <i>d.</i>
C.	29	11	0	8	18	9	20	12	3	If there had not been 1,265 failures (26 per cent.) to an acre, the profit would have been increased by £8 1 <i>s.</i> 2 <i>d.</i>

54. **PERMANENT CROPS.** The cocoa and coffee plantations started in 1913 for the first time last year gave a sufficient yield to carry out small fermentation trials. Some interesting figures have been obtained.

55. *Cocoa.* The trees in the cocoa plot were $4\frac{1}{2}$ years old at the end of the year. The trees yielded a total of 3,237 pods of which 552 were diseased. The area of the cocoa plot is 1.08 acres.

The pests found in the plantation are dealt with under section XV in this report.

56. COCOA FERMENTATION TRIALS.

Lot.	No. of Pods.	Weight of Wet Cocoa lb.	Weight of Dry Cocoa lb.	No. of Days fermented.	Per Cent of Dry to Wet Cocoa	REMARKS.
1	500	114 $\frac{3}{4}$	44	7	38.46	Darkish brown colour. Seed coat breaks easily. Cotyledons open and crumbles readily with pressure. Colour of cotyledons chocolate. Practically free of bitterness.
2	377	73	27	9	36.98	As above, but darker in colour.
3	630	136	48 $\frac{3}{4}$	10	33.56	Colour very dark. No bitterness. Very brittle when dry.
4	129	23 $\frac{1}{2}$	11	7	46.56	Light brown colour. Cotyledons light chocolate in colour. Taste slightly bitter.

The produce at hand for experimenting with was limited ; that accounts for uniform amounts not being experimented with in each lot.

When small quantities of wet cocoa as lot 4 in above trials are put in fermenting boxes, the fermentation does not rise as high and as quickly as in the case of a large amount of wet cocoa undergoing a similar fermentation. Also the period of fermentation small lots is longer than for large lots, provided the conditions are the same. For example, although lots 1 and 4 were given the same period of fermentation, it is obvious that lot 4 is less fermented than lot 1.

57. The fermentation experiments show that the longer the cocoa is fermented the lower is the percentage of the dry prepared beans to wet cocoa. This, of course, is natural. The loss in weight is due to fermentation and the object of the cocoa grower is not to exceed the point of fermentation at which the best sample of cocoa is secured, in order to avoid loss in weight of produce by putrefactive and unfavourable ferments coming into play. When cocoa is over-fermented the bean is very dark in colour and it has an unpleasant taste and smell. The dry beans are also liable to get mouldy.

Lot 4 was under-fermented and it yielded 46.56 per cent. of dry beans, whereas in lot 3 there was an output of 35.5 which lot appears to be slightly over-fermented.

58. Small holders of cocoa who only have small daily pickings of about 50 to 100 lb. wet cocoa will require to carry out the fermentation for eight to nine days. No hard and fast rule can be stated as the period of fermentation depends on the quantity of wet cocoa, conditions of fermentation, humidity, temperature, etc. By experience only, the desired results can be attained.

59. CONDITION AND YIELD OF COCOA PLOT AT THE EXPERIMENTAL FARM NJALA, AT FOUR-AND-A-HALF YEARS OLD.

Area.	Number of Trees.	Number of Bearing Trees.	Yield of Pods per Plot.	Yield of Pods per Bearing Trees.	Yield of cured Cocoa per Tree.	Yield of cured Cocoa per Acre. Trees planted 15ft. x 15ft.
1.08	231	207	*3,237	15.6 lb.	1.4 lb.	271 lb.

* Of these 552 were diseased pod.

In 1916 this plot yielded 277 pods.

60. Careful observations have been made on this cocoa plot with a view to future selection for stock purposes. One tree in particular has marked characteristics. It is vigorous in growth and of a healthy appearance, the leaves are large and dark green. The tree bears long pointed pods with a reddish tinge of the Forastero type. As the tree is hardy and stands the dry season well it is under observation with a view to selection in the future, because at present it appears to be an ideal type for the locality. Owing to the cross polination that has taken place in the past in all cocoa countries it is practically impossible to secure a variety of cocoa that is true to type from seed.

61. Further plots of cocoa, totalling about 6.25 acres, are progressing favourably. The plants on these plots vary from one to two years. Trials are being made on different types of soil.

62. *Coffee.* The Congo coffee, *C. robusta*, plot bore fairly well. The opportunity was taken to carry out fermentation trials. This plantation is four years and four months old. The following data give the condition of the plot :—

Area.	No. of Trees.	No. of Bearing Trees.	Quantity of Berries gathered.	Yield in Berries per Bearing of Tree.	Yield of prepared Coffee per Plot.	Yield of prepared Coffee per Tree.	Number of prepared Coffee to Berries.
.73	300	265	976 lbs	3.68 lb.	250 lb.	.94	25.84

63. COFFEE FERMENTATION TRIALS.

Lot.	Weight of Ripe Berries.	Weight of prepared polished Coffee.	No. of prepared polished Coffee to Ripe Berries.	Method of Preparation.
1.	102 lb.	20 lb.	19.58	Pulped in mortar. Fermented with pulped and washed.
2.	144 $\frac{1}{4}$ lb.	32 lb.	22.18	As lot 1, but not washed.
3.	185 lb.	48 lb.	26.08	Berries fermented in box on an average for six days and then hulled and cleaned by machine.
4.	184 $\frac{3}{4}$ lb.	50 lb.	27.06	Berries fermented in box on an average for six days and then hulled and cleaned by machine.
5.	233 lb.	66 $\frac{3}{4}$ lb.	26.38	Berries fermented in box on an average for six days and then hulled and cleaned by machine.
6.	76 lb.	20 $\frac{1}{2}$ lb.	36.97	Berries fermented in box on an average for six days and then hulled and cleaned by machine.
7.	32 lb.	9 $\frac{1}{2}$ lb.	28.90	Berries fermented in box on an average for six days and then hulled and cleaned by machine.

64. Owing to the department not possessing a pulping machine, trials were made by pulping in a wooden mortar. This method is laborious. The parchment and silver skin in each case were removed by hand power machines. The cost of hulling and winnowing 100lb. of fermented beans was 1s. 4d. to 1s. 6d.

65. The conclusions drawn from the fermentation trials of coffee were :—

- (a) When berries were pulped and allowed to ferment in the pulp the percentage yield of prepared coffee to berries was lower than when the berries were fermented in a box without being first pulped.
- (b) The period of fermentation required for lots 1 and 2 was shorter than in lots 3 to 7.
- (c) The temperature of lots 1 and 2 rose quickly in the fermenting box, whereas in lots 3 to 7 the fermentation process took a longer period and the mass did not get as hot as in lots 1 and 2.

66. The other plots of young coffee, totalling about 3.5 acres, comprise the following varieties :—*C. stenophylla*, *C. liberica*, *C. robusta* (varieties), *C. arabica* var and *C. canephora*. These are growing satisfactorily.

67. *Para Rubber*. The rubber plots are on different types of soil, and total in area about 6.5 acres. The older plot started in 1914 was badly damaged by deer during the early part of the year. The trees had their bark torn. A stick fence was put round the rubber plots and the damaged trees pruned back as the stipule area had been badly lacerated.

68. *Kola*. The trees have made satisfactory growth on the various plots which total nearly five acres.

69. *Limes*. The total area of plots is about 2.5 acres. A small crop of limes was got from the four-and-a-half years old plots. The trees have grown well, despite the attack of Chrysomelid beetles on the tender young shoots.

70. *Coconuts*. This comprises 6.5 acres of land. Trial plots have been made on different soils. The Ceylon coconuts, planted out 1100 in 1915, have put on extraordinary growth during the past year. These plants are on slightly rising laterite gravel soil.

71. *Fruit Trees*. The following table gives an idea of the condition of the grafted stock that has been planted out :—

Name	Number imported 1916.	Number added 1916.	Total Plants end of 1917.	Remarks.
Mango	6	4	3	"Gou Alphonse" and "Peters." Healthy and growing strong.
Orange	12	9	9	Fair growth. Foliage damaged by grasshoppers.
Grape fruit	7	5	5	Healthy, fair growth. Damaged by grasshoppers.
Mandarines	6	1	1	Healthy, good, strong growth.
Tangerines	6	3	3	Healthy, good, strong growth.

The following table gives the condition of the fruit tree in the fruit aboretum—

Name.	Number started 1916.	Number planted 1917.	Number died 1917.	Remarks.
Oranges, local ...	16	23	2	Growth poor. Foliage destroyed by grasshoppers and larvae.
Guava, various ...	8	39	3	Healthy. Good growth.
Cashew ...	5	—	3	Healthy. Good growth.
Terminalia ...	5	—	—	Healthy. Good growth.
Jak fruit ...	4	—	2	Healthy. Attacked by grasshoppers.
Artocarpus, various	—	9	6	Weak growth, slow.
Loquat ...	12	—	—	Steady growth.
Mango ...	99	—	—	Named seedlings from America. Healthy.
Sour sop ...	—	18	1	Healthy. Slow strong growth.
Star apple ...	2	—	—	Healthy. Slow strong growth.
Sapodilla ...	2	—	—	Fairly healthy. Slow strong growth.
Shaddock ...	—	8	—	Poor growth checked by grasshoppers.
Lemon ...	—	6	—	Fair growth, healthy. Damaged by grasshoppers.
Rose apple ...	—	11	—	Growing vigorously.
Custard apple ...	—	4	4	—
Eugenia ...	—	11	—	Healthy. Very slow growth.
Avocado pear ...	—	5	4	Good healthy growth.
Flacourtia ...	—	4	—	Healthy. Growing slowly.
Nam nam ...	—	4	1	Healthy. Very slow growth.
Karambolo ...	—	4	—	Growth healthy and vigorous.
Miraculous berry	—	1	—	Doing fairly well.
Sweet lime ...	—	1	—	Good growth. Foliage damaged by grasshoppers.

XV Pests.

72. *Cocoa*. The oldest cocoa plot at the Experimental Farm was attacked by pests. The first appearance of the attack was noticed by the terminal shoots withering, and "die back" setting in. Specimens of diseased branches and stems were forwarded to the Director of Agriculture, Gold Coast.

73. Mr. R. H. Bunting, the Acting Director and Government Mycologist, reported as follows :—

"I have the honour to state that the specimen of diseased cocoa branch has been examined, but no fungus has been found likely to cause the disease. There are, however, at several points on the branch wounds caused by the "Cocoa Bark Sapper" (*Sahlbergella theobroma* and *S. singularis*), and I attribute the condition of the specimen to the attack of one or both of these insects."

Mr. W. H. Paterson, the Government Entomologist, Gold Coast, reported as follows :—

"The question of these two insects—"Sankonuabe" and "Cocoa mosquito" is of such vital importance, that I shall be greatly obliged if you will inform me if you are successful in finding them in your Colony.

2. The final stages of the wounds is much the same, whether caused by "Sankonuabe" or "Cocoa mosquito." The latter is not, however, able to suck lignified shoots, but confines its attention to the green ones and to the fruit.
3. *Sahlbergella theobroma* and *S. singularis* are found together generally. In addition to silk cotton and cocoa, you might find them also on cotton (*Gossypium*). This is apparently a new food plant. I have found two instances of the insects using this plant in different localities, though I have not since seen cotton and cannot make any further statement as to the extent to which cotton is used as a food plant. Unfortunately, we are very much in the dark as to the natural food plant of "Sankonuabe" and until we can determine its distribution and hosts, we shall make but little progress in the search of its biological control."

74. I am indebted to Messrs. R. H. Bunting and W. H. Patterson of the Gold Coast Agricultural Department for their help in identifying the cause of this serious damage done to cocoa at the Experimental Farm. Cocoa trees in Northern Sherbro were also found to be injured in a similar manner and it is evident that the plantations there are subjected to the attacks of "Sankonuabe" or "Akate" *Sahlbergella theobroma* and *S. singularis*, and the "Cocoa mosquito" *Helopeltis* sp. Vide IX cocoa cultivation in Northern Sherbro, para. 34, of this report.

75. On comparing the results of observations at the Experimental Farm with methods of attack of "Sankonuabe" and its effect on cocoa on the Gold Coast as described in the Annual Reports of the Agricultural Department, Gold Coast, I have not the slightest doubt that the destruction to cocoa and the cause of the "die back" is due to *Sahlbergella* spp. I have succeeded in finding a few of these Hemipterous insects lately.

76. "Cocoa Mosquito" *Helopeltis* sp. The pods of cocoa both at the Experimental Farm and in Northern Sherbro have been found pitted with dark spots, which to all appearances are like centres of invasion of some fungus. These spots are found to be caused by a sucking bug, called the "Cocoa Mosquito," *Helopeltis* sp. Young pods succumb to the ravages of this insects, these immature pods turn black, shrivel up and die. Fairly mature pods overcome these punctures made by the "Cocoa Mosquito" but the pods appear spotted at first and eventually get scabby, such pods never develop to a large size.

77. Mr. W. H. Patterson, the Government Entomologist, Gold Coast, reports :—

"The damage done by the three suctorial bugs, *Helopeltis* sp and "Akate," *Sahlbergella theobroma* and *S. singularis* is enormous. From what I have seen from the plantations, I should estimate that 25 per cent. of the possible

output is lost by 'disease, the major portion of which loss should be ascribed to these insects." (Report on the Agricultural Department for the year 1913, Gold Coast Colony.)

"*Sankonuabe* continues to be most alarming pest and many thousands of acres are rendered worthless through the activities of this insect seconded by the lack of attention to the ordinary details of Cultivation." (Report on the Agricultural Department for the year 1914, Gold Coast Colony.)

78. *Lepidopterous larva*. The cocoa pods were tunnelled by a *lepidopterous larva*, *Characoma stictigrapla*, the Grey moth borer of cocoa pods. So far I have found the attacks very limited but the wounds caused by the larva are a danger to planters in that they are ready centres of invasion for fungoid diseases.

79. Observations and investigations have been carried out whenever possible by my staff. The pests of cultivated crops in Sierra Leone are legion, because rapid invasion of insects and fungi occur from the neighbouring bush into cultivated areas. Very little is known about these pests. It is impossible to carry out systematic and continuous work with the too small staff at my disposal. *Sahlbergella theobroma* and *S. singularis*, and *Hedychia* sp. are looked upon as exceedingly serious enemies to the development of cocoa on the Gold Coast. These pests are also in Sierra Leone beyond doubt and there is every chance of them becoming a serious hinderance to the development of a most promising cocoa industry in the south-east of the Protectorate.

80. *Citrus Trees*. The young growing stems of citrus plants have been attacked by the larvae of Chrysomelid beetles. In some instance the damage has been serious to the young stock.

81. *Grasshoppers*. At the close of the rainy season the Experimental Farm was subjected to a plague of grasshoppers (*Zonocerus variegatus*). The hoppers swarmed everywhere and the invasion became alarming. Very few species of plant were spared their voracious attack. The pest was successfully dealt with in their "hopper" stage when these undeveloped adults were found in massive clusters on branches and stems. During the morning and evening the "hoppers" were found inactive when they were caught in nets and destroyed by the thousand. This grasshopper is a very common pest in the Protectorate.

The following plants were subjected to the attacks of this insect:—

Hevea, cocoa (slightly), citrus (except limes, mandarines and tangierines) palms, pigeon pea (*Cajanus*), solanaceous plants, bread fruit, bread nut, jack fruit, artocarpus, terminalia, loquat (slightly), banana, plantains and various vegetables.

During the "dries" a number of white "Cow birds" or "Tick birds," Mendi *Yionegbe*, (a white plumaged stalk-like bird commonly found amongst cattle in Sierra Leone) made their appearance at the Experimental Farm, although no cattle are kept near the place. These birds were found busy feeding on insect-life and on one occasion I saw one of these birds take one of these destructive grasshoppers. Further observations and examination of the crop contents are necessary to note to what extent these birds do prey on these grasshoppers. Poultry will not feed on these insects owing to an objectionable fluid excreted by them.

XVI. Weeds.

82. *Lalang*. *Imperata arundinacea* called by the creoles "Eckong" or "Akong" has become the farmer's curse in the Colony, where large tracks of land either are rendered useless or are difficult and expensive to cultivate. The land at the Experimental Farm is not free of this weed. Last year weeding was taken into hand.

83. *Curse of Mauritius* (*Lantana* sp.), named by the Creole "Helges," owing to the growing popularity of this plant for hedge purposes and consequently, the spread of this obnoxious weed throughout the Protectorate, the Government was advised by this department to have all hedges of this plant at various stations in the Protectorate stocked up and destroyed. Within the last 20 years this plant was introduced at Rotifunk and Moyamba, towns on the railway, at present a large area of land about

these towns is overrun with this weed. The familiar flower heads are even found topping secondary bush in places. Lantana has found the railway clearing an ideal site for its development, here it is found gradually spreading for some distance each side of these stations. The danger of this weed rapidly spreading is not great, perhaps, at present, owing to the secondary bush in this country predominating the land; but to ensure the safety of the agricultural lands of the future, these centres of invasion must be got rid of. Lantana has become so serious a weed to farmers in India, Nawaii, Australia, etc., that these governments have enforced or are enforcing stringent methods of control or eradication.

XVII. **Appendices.**

84. *Appendix. I.* A paper by Mr. W. Waterland, Assistant in the Agricultural Department, entitled "Soil Condition as Indicated by Rice Growth at the Experimental Farm."

I attach the above paper to this report as it deals very ably with the conclusions drawn from the results of the annual experiments carried out at Njala for the last five years. The following is a summary of the chief points in Mr. Waterland's paper:—

- (a) The rapid loss of fertility by continuous cropping of rice when no returns are made to the soil in the form of manure.
- (b) The increase of fertility of such soils by allowing a fallow crop to grow on the land for one year and mulching the land with such crop before sowing the second rice crop.
- (c) The present method of green manuring is not sufficient to maintain fertility as the losses, which occur as a result of cropping and the removal of grain from the land, are not compensated.
- (d) To maintain fertility it is necessary to intensively cultivate beyond an occasional fallow crop being turned into the land as a green manure.
- (e) The natural fertility of the soil at Njala, even after it is recuperated by allowing about six years growth of bush, is not high, and a thorough system of manuring must be adopted in order to grow satisfactory crops.

Appendix. II.

Reports of the agricultural conditions of the various districts by the Commissioners of each district.

Appendix. III.

METEOROLOGICAL RETURNS. The year was noted for its early rains in February and March, this to a slight extent hindered the brushing of farms at that time; but the fine weather in May and early June compensated for this by allowing farmers to proceed with clearing operations.

Appendix. IV.

EXPORT OF NATIVE PRODUCE. CUSTOM'S RETURNS.

I have the honour to be,

Sir,

Your obedient servant,

DOUGLAS W. SCOTLAND,

Director of Agriculture.

APPENDIX I.

SOIL CONDITION AS INDICATED BY RICE GROWTH AT
THE GOVERNMENT EXPERIMENTAL FARM

By

H. WATERLAND.

ASSISTANT IN THE AGRICULTURAL DEPARTMENT.

It is admitted by the natives that not more than twenty-five to thirty years ago—*i.e.* before the cessation of inter-tribal wars—farming in Sierra Leone was confined, principally, to the land immediately adjoining the towns and “fakais,” and much of the now Protectorate was covered with virgin forest. On the advent of British protection fear of molestation was removed and the natives, who were most probably aware that the virgin land was more productive than that which had been under cultivation, availed themselves of the opportunity to extend their farming operations with the result that the forest was rapidly destroyed until, practically, nothing remained but a growth of scrub or bush, which was not and still is not permitted to develop to any considerable height.

The outcome of this is the present system of extensive cultivation whereby each year a new site of land for agricultural purposes is cleared by burning the covering vegetation, and the previous year's farm is allowed to go out of cultivation for a period of from six to seven years.

What the capabilities of the virgin land may have been can only be conjectured: the natives make the ambiguous statement that quite a small plot of newly cleared forest ground gave a quantity of rice such as can now only be obtained from a much larger area, and that a man who possessed a rice farm of sufficient size to include three termite mounds was regarded as passing rich. They bemoan the fact that not very long ago less work had to be done because a comparatively small area of land would supply their needs and little or no weeding was necessary. There is no doubt that the wholesale destruction of organic matter has occasioned a very considerable loss of nitrogen and fertility.

In the year 1912 the Agricultural Department was established, the first report of which contained the following statement:—“The chief object is to introduce some form of rotation of crops to prevent the present wasteful method of farming, which consists of cutting and burning fresh bush each year to make farms. Such farms are only cropped one year and then the land is allowed to revert to bush. Trial rotation of crops have already been started at the Experimental Farm, Njala.” For this purpose an area of forty-five acres of land, typical of the rice growing “uplands” of the Protectorate, was cleared of six-year old bush and divided into acre plots.

It is reasonable to assume that the following analysis, performed at the Imperial Institute on soil from ten-year old bush land adjacent to the trial plots, shows approximately the condition of the soil of the cleared land at the commencement of the trials:—

PHYSICAL COMPOSITION.

Gravel	...	...	...	Nil
Sand	...	...	...	50.30 per cent.
Silt	...	...	...	31.00 ,,
Fine sand	...	...	...	17.60 ,,
Moisture at 105° C.	...	...	...	1.11 ,,
* Soluble matter	...	...	...	0.13 ,,

* Including traces of chloride and sulphates. Sodium carbonate was absent.

CHEMICAL ANALYSIS (PER CENT.)

			Total.	Soluble in HCl.	"Assimilable" constituents i.e., portion soluble in 1 % of citric acid solution.	lb. per acre.
Lime	...	CaO	—	·03	—	—
Magnesia	...	MgO	—	·13	—	—
Potash	...	K ₂ O	—	·09	·004 per cent.	105
Ferric oxide	...	Fe ₂ O ₃	—	·96	—	—
Phosphoric acid	...	P ₂ O ₅	—	·03	·002 per cent.	52
Nitrogen	...	N	* ·088	—	—	—
Carbon dioxide	...	C O ₂	·030	—	—	—
Loss on ignition	...	...	6·380	—	—	—
Humus	...	...	† ·860	—	—	—

* Equivalent to 2,307 lb. per acre.

† Containing nitrogen 6·6 %

Figures for "lb. per acre" calculated for a depth of nine inches.

Physically, the soil is a light, sandy loam, moderately retentive of moisture, and capable of being easily and economically worked.

As yet sufficient data with regard to the soils of Sierra Leone have not been collected to allow standards to be erected to determine whether a chemical constituent may be regarded as present in large, medium or small quantities, and therefore, in order to interpret the chemical analysis it becomes necessary to adopt such arbitrary standards as are used in other tropical countries, and the Leeward Islands' standards may be conveniently employed here. According to these standards the chemical analysis shows a deficiency in lime and assimilable potash and phosphate. The percentage of nitrogen is low while the humus content is particularly so, and therefore it is most probable that the soil would benefit by green dressings and mulches of pen and allied manures together with occasional applications of lime.

Five years have elapsed since the experiments were established, and the following note forms an attempt to arrive at some conclusion as to the present condition of the soil of the trial plots which, being representative of the "upland" soils of the Protectorate, should give an indication of their fertility.

The information afforded by the experiments is not altogether satisfactory for the purpose, as some of the original plots were thrown out of cultivation, and on a number of the remaining ones the rotation of crops was such as to give no clear conception of the soil fertility. Throughout the trials rice, being the principal food of the natives, received special attention and thus more readily lends itself to show the influence of cultivation than other crops that were grown. It is assumed that, beyond soil fertility, climatic and other factors did not unduly affect the crops as in each of the five years of experiment, yields, corresponding to those obtained from the plots in 1912, were given by similar types of rice grown in the immediate neighbourhood. With the exception that these rices were planted each season on land cleared of six to seven-year old bush, they were grown under precisely the same conditions as those on the trial plots.

In the following table the yields of "husk" or "paddy" rice in bushels per acre are given: the plant names refer to the crops other than rice grown on the plots during the period under review, and which enable the history of any given plot to be followed to the last year it carried rice. The majority of the

plots were one acre in area, none was less than half an acre in extent and no form of manuring was given beyond that of the green dressings and mulches of crop residues as stated. Plot 14a is exceptional in that pigeon peas were grown on it as a "catch crop" and turned into the land during the year 1914.

GOVERNMENT EXPERIMENTAL FARM, SIERRA LEONE.

Table showing Influence of Crop Rotation on Rice yield.

No. of Plot.	Bushels per Acre.				
	1912.	1913.	1914.	1915.	1916.
3a	Ground-nuts	Ground-nuts	10.00	—	—
3b	Ground-nuts	Ground-nuts	14.25	—	—
4b	Ground-nuts	Ground-nuts	10.50	4.00	—
5b	Ground-nuts	Ground-nuts	15.00	3.50	—
7a	12.7	5.7	Ground-nuts	—	—
7b	12.2	2.1	Ground-nuts	8.00	—
8a	11.6	5.6	Cow pea	8.60	—
8b	12.2	6.5	Cow pea	8.50	—
10a	14.0	7.1	—	—	—
10b	18.8	—	—	—	—
11a	17.6	Grass and weeds	15.00	—	—
11b	23.8	Grass and weeds	—	—	—
12a	13.0	4.3	—	—	—
13a	10.2	4.3	—	—	—
13b	19.4	—	—	—	—
14a	15.5	3.6	Mulched with Pigeon pea. 13.8	—	—
25a	Millet.	Ground-nuts	16.0	Grass and weeds	12.0
26	Millet.	15.0	Pigeon pea	Grass and weeds	9.0

NOTE 1.—Figures refer to yields of "husk" rice per acre.

NOTE 2.—Other crops grown as stated in the columns.

From the table it may be observed that when rice was grown on a plot for two successive years, the second year's crop in each case gave a poor return indicating a marked decrease in soil fertility as a result of the first year's cultivation; whereas by introducing a legume, or allowing the plot to grow natural grass and weeds for a year and turning the growth into the land, the fertility was recovered to some extent. It should be remarked that the natural growth which sprang up when a plot was allowed to rest consisted mainly of a tall growing grass (probably a *Pennisetum spp.*) which attained a height of from five to six feet. The influence of green dressings and mulches

on the soil fertility is plainly discernible when the later years rice yields of individual plots are compared with the yield of the primary year taken as 100. The yields of rice in 1913 on plots 7a, 7b, 8a, 8b and 14a, which carried rice in 1912 show, as a result of soil exhaustion, a considerable decrease on the yields obtained in 1912. The decreased yield on each plot compared with the 1912 yield taken as 100 is shown in the following table :—

No. of Plot	Yield (per cent.) 1913 : 1912 yield taken as 100.		
7a	44.8
7b	17.2
8a	48.4
8b	53.3
14a	23.2

In 1914 legumes were grown on plots 7a, 7b, 8a, and 8b and the residual matter of the plants was turned into the land as a mulch before the 1915 rice was sown. This brought about some recuperation of the soil and consequently increased yields of the rice in 1915. The degree of recovered fertility is indicated by the increased yields over those of 1913. The yields stated in terms of percentage of the 1912 crop were as under :—

No. of Plot.	Yield (per cent.) 1915 : 1912 yield taken as 100.		
7a	63.0
7b	65.6
8a	74.1
8b	69.6

Plot 14a was cropped with rice in three successive years. In the second year (*i.e.* 1913) the yield fell to 23.2 per cent. as compared with that of 1912 as 100. The exhaustion of the soil was partly remedied by a heavy mulch of pigeon peas which, as already mentioned, were grown as a "catch crop" and turned in five months prior to sowing with rice in 1914, in which year the yield rose from 23.2 per cent. to 89.0 per cent.

The effect on the rice yields of the method of cultivation adopted and the condition of the soil in its relation to the crop is indicated by the following Diagram 1.

Reference to Diagram 1.

PERCENTAGE RICE YIELDS—1912 YIELD TAKEN AS 100.

No. of Plot.	1912.		1913.		1914.		1915.	
	Crop carried by Plot in previous Year.	Yield per cent.	Crop carried by Plot in previous Year.	Yield per cent.	Crop carried by Plot in previous Year.	Yield per cent.	Crop carried by Plot in previous Year.	Yield per cent.
Average of 7a and 7b	Bush	100	Rice	31.4	—	—	Ground-nuts	64.5
Average of 8a and 8b	Bush	100	Rice	30.4	—	—	Cow pea	71.4
14a	Bush	100	Rice	23.2	Plot heavily mulched with pigeon pea in 1914 before rice was sown	89.0	—	—

Whereas on the five plots already mentioned two crops of rice were grown in consecutive years, (*i. e.* 1913—1914), which resulted in considerably decreased yields in the second year due to loss of fertility by the soil, which loss was partially made good by green dressings and mulches in the third year, on a further series of plots 11a, 11b, 25a and 26, after rice an intermediate crop producing humus-forming matter was grown and turned into the land previous to planting a second time with rice. After harvesting rice from plots 11a, 11b and 25a natural grass and weeds were allowed to develop in the second year and the growth turned in before sowing rice in the third year. On plot 26, after rice, pigeon peas were sown in the second year. This sowing was left very late and a poor crop was obtained, which was turned into the land and grass and weeds allowed to grow in the third year. This growth was also used to mulch the plot before planting rice in the fourth year.

It will be seen from the table that a direct result of the mulches of organic matter was a partial maintenance of soil fertility; and the yields of rice from the plots, though reduced as compared with those of the primary years, fall practically within the same range of yields obtained in 1915 from plots 7a, 7b, 8a and 8b, as shown by the following figures:—

No. of Plot.	Yield (per cent.) :—			
	Yield of Primary Year taken as 100.			
11a 11b average	78.4
25a	75.0
26	60.0

It is interesting to compare the rice growth on plots 4b and 5b with the growth on the above four plots. In 1914, and again in 1915 rice was grown on plots 4b and 5b, and there being no opportunity for recovery from the exhaustion of soil which occurred in 1914 the yields obtained in 1915 were very low; a fall on the 1914 yields of 61.9 per cent. in the case of 4b, and 76.7 per cent. in 5b resulted.

Diagram II, which should be compared with Diagram I, indicates to what degree soil fertility was maintained by mulching with organic matter.

Reference to Diagram II.

PERCENTAGE RICE YIELDS—YIELD OF PRIMARY YEAR TAKEN AS 100.

No. of Plot.	1912.		1913.		1914.		1915.		1916.	
	Crop carried by Plot in previous Year.	Yield per cent.	Crop carried by Plot in previous Year.	Yield per cent.	Crop carried by Plot in previous Year.	Yield per cent.	Crop carried by Plot in previous Year.	Yield per cent.	Crop carried by Plot in previous Year.	Yield per cent.
Average of 11a and 11b	Bush	100			Weeds and grass	72.4				
26			Millet	100			Pigeon pea		Grass and weeds	60.0
25a					Ground-nuts	100			Grass and weeds	75.0
Average of 4b and 5b					Ground-nuts	100	Rice	29.1		

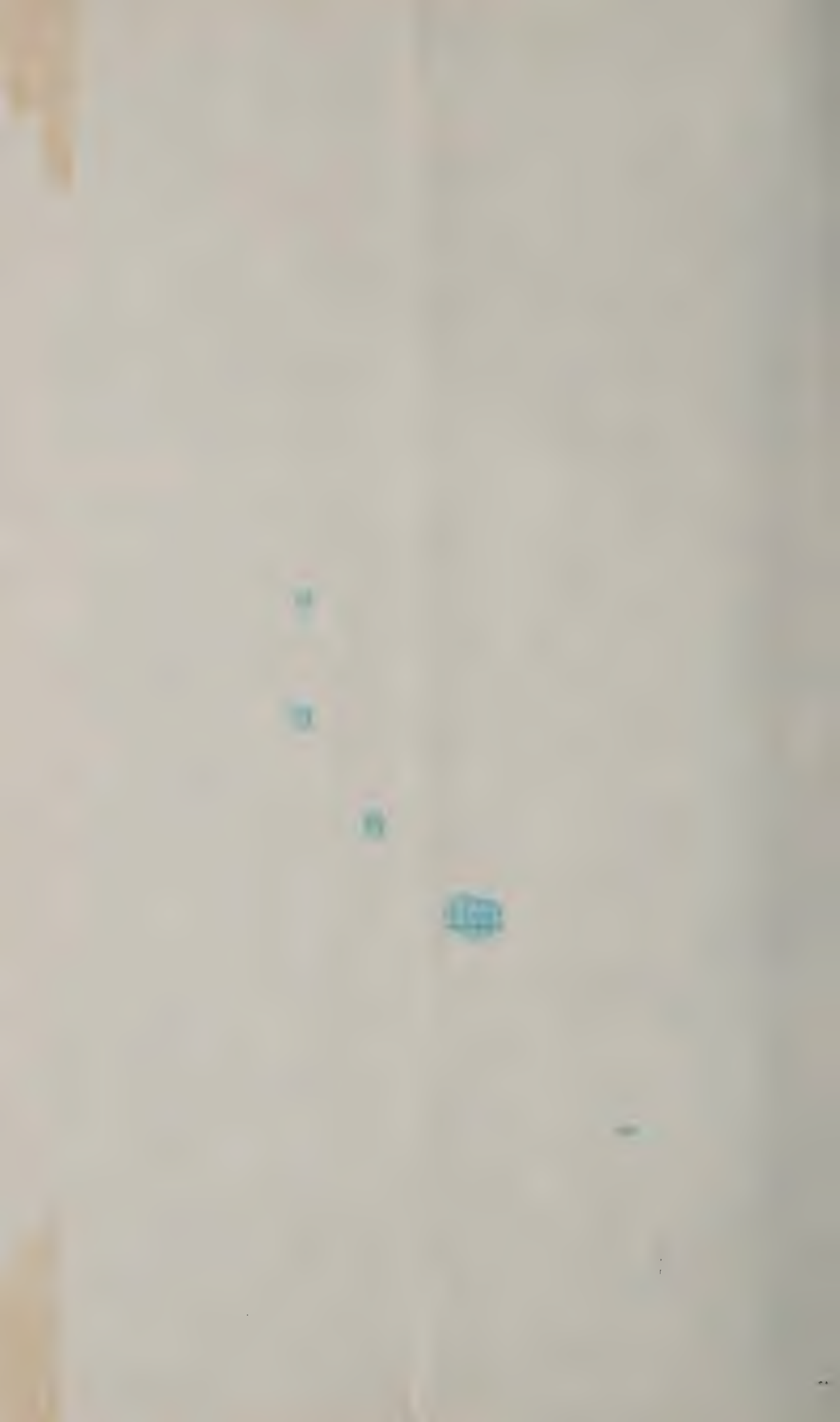


Diagram III presents a curve of the yearly average yields over five years of a variety of local rice called "Jobboi." Throughout the trials this rice held a prominent position, and the yields obtained from it show somewhat markedly the influence of crop rotation and the gradual decline in soil fertility under the system of cultivation carried out. The following table shows the history of the plots on which the rices were grown and the average yields of "husk" rice in bushels per acre obtained in each season.

AVERAGE YEARLY YIELDS OF "JOBBOI" RICES.

1912.		1913.		1914.		1915.		1916.	
History of Plot.	Average yield.	History of Plot.	Average yield.	History of Plot.	Average yield.	History of Plot.	Average yield.	History of Plot.	Average yield.
1911 Bush	19.2	1911 Bush, 1912, of 11 plots, 8 carried rice & 3 were covered with 7 years old bush	7.2	1911, Bush, 1912 & 1913, leguminous crops the residues of which were turned into the land	13.0	1911, Bush 1912 and 1913, as 1914 column. 1914 rice	3.5	1912, Bush, 1913, rice & maize. 1914 and 1915, natural grass and weeds; growth turned into the land	7.9

In the curve the average yield for 1912 is taken as a 100 and the average yields for the succeeding years are adjusted to this factor. The figures obtained in this way are :—

Year.	Average yield (per cent.) of "Jobboi" Rice.			
1912	100.0
1913	37.4
1914	67.7
1915	18.2
1916	41.1

From the foregoing it is seen that the system of farming adopted has not sufficed to maintain the fertility of the soil (at least in so far as rice is concerned,) and resource must be had to a more advanced form of manuring in order to counteract the effects of cultivation and cropping. The evidence points to the content of humus and assimilable nitrogen in the soil (which from the outset were deficient) as having been reduced to such an extent that a graminaceous crop, like rice, cannot be grown with any reasonable success until the loss of nitrogen has been made good by manuring. Attention should be directed to the need of organic matter in the form of green dressings of leguminous plants and mulches of pen and allied manures. Conjointly with these, trials should be made of the effect of treating the soil with lime and basic phosphates,—preferable 2 cwt. of basic slag per acre—before sowing the green dressing. Such treatment should result in a better green crop, which should be turned in when the soil is wet and likely to remain so for one or two months, and both the green dressing and the mineral fertilizer should prove more effective as manures.

The introduction on the Experimental Farm of donkeys for draft purposes and local breeds of cattle and sheep as the foundation of a small stock farm is an excellent proposal by the Director of Agriculture, which would, if carried out, go far to lessen the difficulties associated with manuring.

Appended is a list showing analyses of pen and allied manures analysed at the Government Laboratories, Leeward Islands, West Indies.

APPENDIX.

KEY TO TABLE SHOWING COMPOSITION OF PEN
MANURES AND ALLIED MANURES.ANALYSES OF MANURES MADE AT THE GOVERNMENT
LABORATORIES, LEEWARD ISLANDS, WEST INDIES.

1. Pen manure (average of eleven samples)
2. Purchased stable manure
3. Sheep pen manure.
4. Bat guano.
5. Pods of *Pithecolobium Saman*.
6. Weeds, leaves, etc., consisting mainly of *Saman* leaves and pods.
7. Bush, etc.
8. Lemon grass (air dried).
9. Clippings from "*Gliricidia maculata*," (air dried);
10. Maize cobs (air dried).
11. Cacao husks.
12. Lime skins and pulp.
13. Pigeon pea stems and leaves (air dried).
14. Cane tops (air dried).
15. Coconut husk.
16. Sea Island cotton-seed meal.
17. French weed (*Commelyna nudiflora*).
18. Sweet potato vine.

COMPOSITION OF PEN AND ALLIED MANURES.

Number	Water	Organic matter.	Ash	POUNDS PER TON.											
				Phosphoric Acid (P ₂ O ₅)	Potash (K ₂ O)	Nitro-	Ammonia (N H ₃)	Water	Organic matter	Ash.	Phosphoric Acid (P ₂ O ₅)	Potash (K ₂ O)	Nitrogen.	Ammonia (N H ₃)	
1	46.95	26.34	20.47	21	65	69	86	1112.0	609.9	438.9	4.64	13.52	15.86	19.26	
2	57.80	17.88	24.32	18	72	62	75	1295.0	400.5	544.5	4.03	16.13	13.89	16.86	
3	40.60	32.14	27.26	42	79	1.28	1.55	909.5	720.0	620.5	9.41	17.70	28.67	34.84	
4	33.12	—	—	1.04	1.31	1.04	1.26	741.9	—	—	23.36	29.25	23.18	28.18	
5	16.80	—	—	—	—	2.60	3.16	376.3	—	—	—	—	58.24	70.78	
6	12.62	77.90	9.84	16	64	2.12	2.57	282.6	1745.0	212.4	3.49	14.42	47.40	57.60	
7	55.89	39.13	3.89	12	72	69	83	1276.3	876.5	87.2	2.61	16.19	15.54	18.62	
8	13.03	—	—	37	1.16	51	62	291.9	—	—	8.29	25.98	11.42	13.89	
9	11.69	—	—	40	—	3.12	3.79	261.9	—	—	8.96	—	69.89	84.90	
10	9.50	88.74	1.76	20	27	39	47	212.8	1986.9	39.4	4.48	6.05	8.74	10.53	
11	11.70	—	—	32	1.95	1.19	1.44	262.1	—	—	7.17	43.68	26.66	32.26	
12	75.36	23.63	1.01	61	15	31	38	1678.9	438.5	2.26	13	3.31	7.03	8.54	
13	10.78	82.22	7.60	56	1.01	2.00	2.43	212.0	1441.0	15.70	12.50	22.60	44.80	54.40	
14	11.81	80.59	7.60	31	1.84	72	87	264.3	1806.0	170.3	6.94	41.20	16.12	19.50	
15	13.77	83.00	3.23	65	95	24	29	309.1	1859.0	72.3	1.12	2.13	5.40	6.50	
16	10.51	84.56	1.93	1.65	1.12	4.11	5.03	235.4	1895.0	37.00	37.00	25.10	92.70	112.70	
17	89.64	8.24	2.12	—	—	33	40	2008.0	47.5	—	—	—	7.40	9.00	
18	87.84	10.66	1.50	—	—	34	41	1968.0	33.6	—	—	—	7.60	9.20	

APPENDIX II.

KARENE DISTRICT.

CROP REPORT FOR 1917.

Crop.	Increase or Decrease on Area cultivated in 1917.	Remarks.
Rice, upland ...	Considerable increase	The best harvest that we have had for some years.
Rice, swamp ...	Yearly increase The great rice swamp area is along the banks of the Searcies river. People come from all parts of the district to make farms in these swamps and after harvesting their rice return home	Prospects are good, but the rice is not harvested much before January.
Cassada ...	Increase	The cultivation is on the increase every year although not encouraged, as other crops might well take its place viz., maize, yams, etc.
Sweet potatoes ...	About the average	
Ground-nuts ...	Average	Every year the crop appear to suffer from disease. Fresh seed might be introduced with advantage.
Yams ...	About the average	Every endeavour is being made to get the natives to go in for yam cultivation more than they do.
Maize ...	About the average	I had a great success with two crops. One I harvested in July and the second crop in December.
Fundi ...	Increase	This is a catch crop and comes in when other food is scarce—August and September.
Other crops ...	—	Very good harvest indeed.
Guinea corn ...	—	Guinea corn is now grown extensively throughout the Lokko and Timine countries and is the next important one to rice.
Millet ...	—	Millet is largely grown but, owing to the labour attached to the cleaning of the grain from the stock is not so popular as Guinea corn.

H. C. WARREN,

District Commissioner.

RAILWAY DISTRICT.**CROP REPORT FOR 1917.**

Crop.	Increase or Decrease on Area cultivated in 1917.	Remarks.
Rice, upland ...	Area under cultivation on the increase.	In making an estimate of the area under cultivation, it must be born in mind that there are no statistics from which comparative estimates can be prepared. All that can be given is a rough guess, based on casual observation. One thing I have noticed this year for the first time, viz., farms partially reaped and then deserted. The reason seems to be that in some instances farms beyond the reaping power of the farmer have been made. The best alone is reaped the poorer rice on the edge or weedy portion being left to rot.
Rice, swamp ...	Slight increase	
Cassada ...	Slight increase	
Sweet potatoes ...	Stationary	
Ground-nuts ...	Stationary	
Yams ...	Slight increase	
Maize ...	Stationary	
Fundi ...	Stationary	
Other crops ...	Cotton, large decrease	

W. D. BOWDEN,

*District Commissioner.***NORTHERN SHERBRO DISTRICT.****CROP REPORT FOR 1917.**

Crop.	Increase or Decrease on Area cultivated in 1916.	Remarks.
Rice, upland ...	Increase ; due to privation suffered in 1916 through shortage and partial failure of crop	Very good ; rains favourable and continued late.
Rice, swamp ...	Do.	Do.
Cassada ...	Increase : due to general shortage of food-stuff in 1916.	Much planted on coastal lands and Turner's Peninsula. The steady and prolonged rains have favoured a great crop.
Sweet potatoes ...	The same area	Very good. Large quantities are cultivated in this district.
Ground-nuts ...	Same area	Very small quantities are grown in this district.
Yams ...	The same area	Very good.
Maize ...	Same area	Not as good as usual, possibly owing to too much moisture. Small quantities are grown.
Fundi ...	Not grown	
Other crops...	Same area	Very good. Small quantities grown with rice as a food-stuff.
Berri-seed ...		

W. B. STANLEY,

District Commissioner.

RONIETTA DISTRICT.

CROP REPORT FOR 1917.

Crop.	Increase or Decrease on Area cultivated in 1917.	Remarks.
Rice, upland ...	Very good crop, and of good quality everywhere, except in Buia chiefdom, where the farms were burnt late. Probably rather more rice is planted than last year.	
Rice, swamp ...	About the same as in previous year. Abundant crop of good quality in most of the chiefdoms near the coast.	
Cassada ...	More and more of this is being planted every year. Crop generally good, except in the northern chiefdoms, where it has been largely spoilt by animals.	
Sweet potatoes ...	About the same as in previous year.	
Groundnuts ...	Not much grown, except in northern chiefdoms. Crop rather short owing to disease.	
Yams ...	Very little grown. Crop about average.	
Maize ...	About the same as in previous year. Average crop. Quality good on the whole.	
Fundi ...	A little grown in the Timine country, practically none elsewhere. What there is, has done very well.	
Other crops	<p><i>Ginger.</i> Very little dug up, and too early to say what the crop will be. Not so much planted as in 1916.</p> <p><i>Guinea corn.</i> More than in 1916; a very good crop in most places.</p> <p><i>Millet.</i> Same applies as in guinea corn.</p>	

R. S. HOOKER.

District Commissioner, Moyamba.

KOINADUGU DISTRICT.**CROP REPORT FOR 1917.**

Crop.	Increase or Decrease on Area cultivated in 1917.	Remarks
Rice, upland ...	In considerrble increase	Due to 1916 poor crop.
Rice, swamp ...	In considerable increase	Due to 1916 poor crop.
Cassada ...	About the same area	-----
Sweet potatoes ...	An increase	Due to food scarcity from 1916 poor crop.
Ground-nuts ...	An increase	Though more land was under ground-nuts there was a shorter crop than in 1916 due to too much rain.
Yams ...	About the same area	-----
Maize ...	About the same area	-----
Fundi ...	A considerable increase	Due to food scarcity from 1916 poor crop.
Other crop ...	A considerable increase	Due to food scarcity from 1916 poor crop.
Guinea corn ...		

J. CRAVEN,
District Commissioner.

SHERBRO DISTRICT.

Crop.	Increase or Decrease on Area cultivated in 1917.	Remarks.
Rice, upland ...	-----	This district cannot be called a rice growing country. Quantities are imported from the Protectorate for consumption and sale.
Rice, swamp ...	-----	Do.
Cassada ...	-----	In this district cassada is the staple food and it is grown in large quantities.
Sweet potatoes ...	-----	Very little grown locally. Quantities are imported from the Protectorate for food.
Ground-nuts ...	-----	This is not a ground-nut district. The soil is not favourable.
Yams ...	-----	Very little grown. We grew a yam weighing 1 cwt., 2 qrs. and 13 lb., but this is not the usual size.
Maize ...	-----	A little maize is grown for consumption.
Fundi ...	-----	Plenty is grown in Dema chiefdom and is brought to Bonthe for sale.
Other crops.		

W. ADDISON,
District Commissioner.

APPENDIX III.

METEOROLOGICAL RETURNS.

STATION—EXPERIMENTAL FARM, NJALA.

MONTH.		Average Shade Maximum.	Average Shade Minimum.	Highest Shade Maximum.	Lowest Minimum Tem- perature.	Relative Humidity 9 a.m.	Relative Humidity 3 p.m.	No. of Days Rain fell.	Rain.
January ...	...	90·97	68·80	95·00	64·00	77·70	63·04	1	·60
February	...	92·10	69·28	95·00	63·00	75·40	59·54	5	2·64
March ...	...	93·74	69·32	96·00	65·00	73·17	54·41	7	1·29
April ...	...	95·50	70·56	103·0	66·00			6	2·33
May ...	...	92·70	72·19	96·00	67·00			16	5·01
June ...	...	98·20	69·40	92·00	62·00			20	11·31
July ...	...	88·10	67·60	93·00	60·00			25	12·14
August ...	...	83·70	67·90	91·00	66·00	82·90	82·90	28	21·17
September	...	83·70	68·80	88·00	66·00	85·50	82·90	28	19·83
October ...	...	84·30	68·40	107·0	67·00			20	15·79
November	...	82·63	68·10	92·00	65·00			16	8·46
December	...	92·20	68·96	91·00	64·00			4	1·54

METEOROLOGICAL RETURNS—*continued.*

STATION—BATKANU.

MONTH.	Shade Maximum 5 p.m.	Shade Minimum 9 a.m.	Dry Bulb 9 a.m.	Wet Bulb 9 a.m.	Dry Bulb 5 p.m.	Wet Bulb 5 p.m.	Dew Point.	Relative Humidity.	Rain.
January ...	94.19	69.16	79.61	74.67	86.80	78.12	71.94	66.93	—
February ...	103.60	70.07	79.96	75.53	88.25	80.78	74.60	74.96	2.28
March ...	98.06	71.48	82.16	74.70	91.16	74.43	68.73	56.77	.74
April ...	100.15	72.11	84.20	77.60	88.41	77.26	68.62	53.78	1.39
May ...	99.24	73.51	78.25	73.87	87.43	77.96	71.44	70.48	8.23
June ...	92.36	70.23	77.20	74.1	85.83	78.46	72.80	75.58	12.32
July ...	89.64	69.61	77.93	75.54	85.67	78.58	73.95	77.93	19.05
August ...	87.70	67.80	76.96	75.19	81.12	77.74	74.72	86.96	30.10
September ...	87.80	68.80	78.03	75.76	82.00	78.53	75.11	84.80	22.35
October ...	92.08	69.00	79.91	76.04	84.52	78.62	74.07	76.54	17.00
November ...	91.53	68.00	79.96	72.13	86.43	78.50	73.75	74.61	11.00
December ...	90.87	66.03	75.41	74.83	84.50	78.00	73.27	77.85	.63

STATION—Bo.

MONTH.	Shade Maximum 5 p.m.	Shade Minimum 9 a.m.	Dry Bulb 9 a.m.	Wet Bulb 9 a.m.	Dry Bulb 5 p.m.	Wet Bulb 5 p.m.	Dew Point.	Relative Humidity.	Rain.
January ...	90	68	79	75	83	77	72	75	.18
February ...	93	67	80	74	88	77	70.5	65.8	2.20
March ...	93	69	81	75	88	76	72	66	2.90
April ...	96.00	69	83	77	88	78	72	66	2.66
May ...	98.00	69	81	76	84	78	73	73	6.20
June ...	88.54	69	79	75.6	80.2	76.8	80.86	82.19	12.44
July ...	82.54	69	79	75.6	80.2	76.8	74.37	82.41	14.94
August ...	84.80	69.5	76.51	74.3	77.00	75.09	73.53	95.66	17.84
September ...	84.4	68.02	76.8	74.8	77.2	75.1	73.1	87.65	20.19
October ...	88.7	68.3	80.60	77.6	82.7	79.8	76.6	85.1	12.80
November ...	87.4	68.8	80.0	77.20	81.50	79.20	67.70	87.30	9.78
December ...	81.0	71.2	79.1	70.0	81.41	78.70	—	85.1	1.44

METEOROLOGICAL RETURNS—*continued.*

STATION—KISSY.

MONTH.	Shade Maximum 5 p.m.	Shade Minimum 9 a.m.	Dry Bulb 9 a.m.	Wet Bulb 9 a.m.	Dry Bulb 5 p.m.	Wet Bulb 5 p.m.	Dew Point.	Relative Humidity.	Rain.
January ...	89·87	73·09	81·96	74·06	91·03	73·54	68·61	67·16	—
February ...	89·38	72·36	77·07	72·75	90·75	72·71	67·08	64·96	·27
March ...	90·06	73·12	85·28	73·38	90·0	73·41	37·19	53·90	—
April ...	90·6	75·7	87·13	73·03	89·4	75·7	67·19	52·37	1·70
May ...	89·48	75·80	84·41	76·00	90·38	76·80	69·95	68·16	8·03
June ...	89·03	75·83	81·46	81·7	87·53	83·13	68·34	66·8	7·85
July ...	87·80	75·36	81·12	78·32	88·09	74·80	70·73	69·87	17·72
August ...	81·87	70·58	74·51	72·62	81·22	70·03	69·53	75·96	33·95
September ...	82·8	71·13	83·63	72·13	85·33	71·23	65·97	62·4	24·70
October ...	81·51	70·09	80·87	70·41	81·3	71·77	62·79	52·45	4·08
November ...	80·43	70·06	80·16	69·56	81·56	71·30	61·48	53·70	8·18
December ...	81·45	70·77	81·87	71·22	82·90	71·70	63·92	54·45	·63

STATION—KABALLA.

MONTH.	Shade Maximum 5 p.m.	Shade Minimum 9 a.m.	Dry Bulb 9 a.m.	Wet Bulb 9 a.m.	Dry Bulb 5 p.m.	Wet Bulb 5 p.m.	Dew Point.	Relative Humidity.	Rain.
January ...	87·3	62·6	76·4	72	81·9	73·4	70·69	75	·60
February ...	92·5	65·1	78·3	72·3	83·4	78	71·87	74	2·79
March ...	93·2	66·1	00·6	75·8	86·1	79	72·9	72·6	·25
April ...	93·8	65·1	80	73·8	86·6	79·4	72·04	69·3	2·72
May ...	88·2	66·6	79·2	75·6	8·7	76·6	70·97	74·1	6·55
June ...	82·2	66·3	77·6	73·8	79·7	76·03	72·24	80	12·93
July ...	84·3	65·6	72·5	69·1	77·1	73	69·9	81	16·06
August ...	81·9	66·1	79·2	72·0	75·8	72·5	69·9	66	16·16
September ...	82·8	64·7	78·2	72·6	78·6	72·5	70·33	85·5	13·66
October ...	86·03	67·4	76·03	73·1	78·1	74·7	71·07	79·0	14·78
November ...	82·20	65·80	71·00	71·60	76·60	73·70	70·17	84·50	10·11
December ...	86·80	65·90	75·2	71·80	81·90	71·50	—	81·00	·72

METEOROLOGICAL RETURNS—*continued.*

STATION—MOYAMBA.

MONTH.	Shade Maximum 5 p.m.	Shade Minimum 9 a.m.	Dry Bulb 9 a.m.	Wet Bulb 9 a.m.	Dry Bulb 5 p.m.	Wet Bulb 5 p.m.	Dew Point.	Relative Humidity	Rain.
January	91.3	68.4	78.4	75.2	83.7	77.6	73.3	77.9	1.08
February	93.2	68.6	78.5	78.5	74.3	83.8	75.5	70.6	1.43
March	95	69.9	82.3	75.8	85.8	77.2	71.6	66.6	.75
April	95.2	70.3	83.2	76.7	84.9	77.3	72.3	68.1	4.51
May	90.6	71.4	80.7	76.2	82.1	76.4	72.9	75.8	3.90
June	88.2	70.9	79.9	76.1	80.6	76.6	73.7	80.7	9.83
July	86.8	70.9	78.3	74.9	78.5	75.2	72.8	79.8	14.85
August	82.8	70.0	77.00	74.4	77.0	74.4	72.6	86.7	26.49
September	82.1	68.8	77.4	74.8	77.3	75.1	73.2	87.2	15.73
October	90.1	70.1	80.6	76.1	81.3	76.7	73.3	70.0	13.49
November	88.70	70.30	79.30	76.00	80.40	77.00	74.10	83.10	7.21
December	89.00	68.80	78.20	71.90	80.60	73.50	70.00	82.70	.73

STATION—HILL STATION.

MONTH	Shade Maximum 5 p.m.	Shade Minimum 9 a.m.	Dry Bulb 9 a.m.	Wet Bulb 9 a.m.	Dry Bulb 5 p.m.	Wet Bulb 5 p.m.	Dew Point.	Relative Humidity.	Rain.
January	84	71.6	75.3	72.9			71.6	89	.05
February	83.2	70.4	75	73			71.6	89	.18
March	85.9	72.2	76.4	74			72.6	89	.07
April	85.9	72.9	77.5	75.3			73.6	89	1.10
May	84.5	72.4	76.7	75.9			75.1	94.9	12.1
June	83.3	70.6	72.7	71.8			75.1	94.6	17.98
July	81.6	70	74.9	74.2			73.7	96	32.29
August	77.0	69.0	73	72			72.2	94	52.85
September	80.43	69.23	74.8	73.3			72.44	91.8	39.19
October	83.5	66.5	75.5	73.03	75.09	72.7	71.15	87.3	6.43

METEOROLOGICAL RETURNS—*continued.*

STATION—

MONTH.	Shade Maximum 5 p.m.	Shade Minimum 9 a.m.	Dry Bulb 9 a.m.	Wet Bulb 9 a.m.	Dry Bulb 5 p.m.	Wet Bulb 5 p.m.	Dew Point	Relative Humidity.	Rain.
January ...	94.19	69.16	79.61	74.67	86.80	78.12	71.94	66.93	—
February ...	90.3	71	81.3	77.5	81.4	77.6	74.9	81.21	1.89
March ...	91.9	73.2	83.1	83.9	78.9	79.7	75.9	80	.86
April ...	92.9	73.83	83.93	79.83	85.53	80.93	77.52	79.23	1.00
May ...	90.58	74.22	82.26	79	82.5	79.1	76.7	82.8	8.62
June ...	86.9	73.5	80.9	77.8	81.1	78.3	76.1	85.5	10.32
July ...	86.4	72.8	80	77.2	79.06	76.8	75.3	87	20.17
August ...	82.1	72.5	77.4	75.8	77.3	75.5	74.63	90.9	43.54
September ...	83.2	72.6	78	76	77.4	75.5	74.6	89.5	26.73
October ...	88.1	72.9	81.2	77.6	81.5	78	75.4	82.2	9.91
November ...	87.10	72.80	80.50	78.40	80.80	79.10	77.50	90.20	7.36
December ...	87.50	72.00	80.20	78.20	80.30	78.90	—	91.10	.72

STATION—DARU.

MONTH.	Shade Maximum 5 p.m.	Shade Minimum 9 a.m.	Dry Bulb 9 a.m.	Wet Bulb 9 a.m.	Dry Bulb 5 p.m.	Wet Bulb 5 p.m.	Dew Point.	Relative Humidity.	Rain.
January ...	89.8	68.1	77.5	73.9	83.8	76.2	71.1	74	.20
February ...	92.1	68.4	79.6	74.1	85.3	76.3	70.4	67.4	2.17
March ...	94	69.7	80.2	74.8	88.5	77.5	70.7	65	.06
April ...	93.8	70.5	81.1	75.1	88.1	77.1	70.5	64.5	70.7
May ...	90.9	70.5	80	75.5	83.8	76.3	71.9	72.4	5.20
June ...	89.0	69.0	78.0	80.0	74.0	75.0	72.0	79.0	13.26
July ...	89.0	70.0	77.0	74.0	79.0	75.0	72.2	81.0	13.32
August ...	85.0	70.0	76.0	73.0	76.0	74.0	71.8	75.5	17.65
September ...	82.2	69.8	75.8	73.4	77.5	74.5	72.1	86.6	19.12
October ...	90.0	69.0	79.0	76.0	83.9	78.0	75.5	82.43	6.60
November ...	90.20	69.60	70.30	76.00	81.80	79.70	76.18	91.50	13.55
December ...	91.54	68.41	75.58	73.51	80.83	77.03	—	85.38	1.20

MILITARY HOSPITAL, FREETOWN.—OBSERVATION TAKEN AT 9. A.M.

MONTH.	Temperature in Shade.		Rain.	Remarks.
	Maximum.	Minimum.		
January ...	89·00	74·00	—	
February ...	87·00	73·00	·70	
March ...	90·00	75·00	·10	
April ...	90·00	75·00	1·10	
May ...	—	—	—	
June ...	86·00	74·00	12·79	
July ...	85·00	72·00	24·76	
August ...	82·00	72·00	38·40	
September ...	84·00	72·00	30·72	
October ...	87·00	72·00	7·91	
November ...	87·40	72·96	4·85	
December ...	87·64	74·22	1·98	

APPENDIX IV.

EXPORT OF NATIVE PRODUCE—CUSTOMS RETURNS.

		1915		1916		1917	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
			£		£		£
Benniseed ...	... tons	—	—	16	218	33	622
Ginger ...	... tons	567	8,091	971	25,814	1,137	25,863
Gum Copral		—	—	—	—	—	—
Hides ...	... leaves	11,564	5,554	14,989	6,397	9,167	4,667
Ivory ...	... cwts.	—	—	4	13	8	266
Kola nuts ...	... tons	2,042	235,406	2,484	302,723	1,702	321,105
Palm kernels ...	... tons	39,624	504,033	45,316	680,705	58,020	842,508
Palm oil ...	... galls.	481,576	45,671	547,751	53,622	54,311	62,375
Pepper ...	... tons	—	—	97	5,728	50	2,681
Piassava ...	... tons	1,283	27,491	883	18,998	470	8,300
Rice ...	... bushels	21,600	7,228	3,192	1,364	1,022	697
Rubber ...	... tons	1	40	10	1,848	1	82
Other products ...	...	—	19,237	—	—	—	15,606
			£933,384		£1,097,548		£1,284,772

